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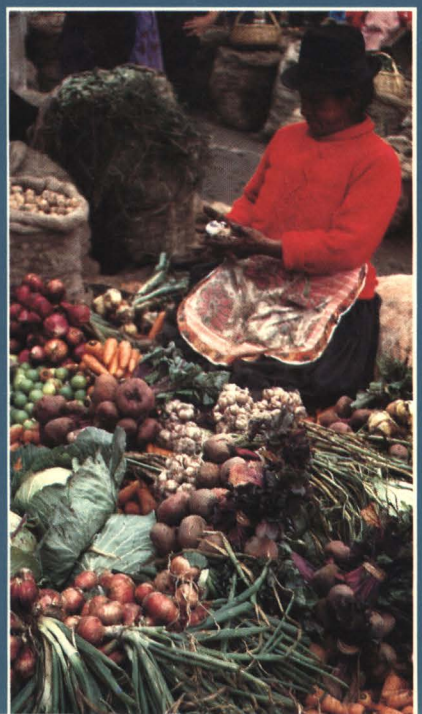
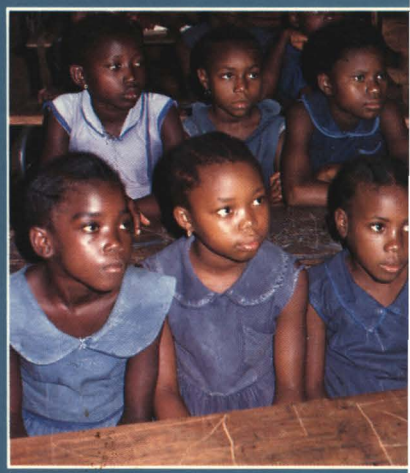
Review of IDRC Activities 1982





INTERNATIONAL DEVELOPMENT RESEARCH CENTRE
CENTRE DE RECHERCHES POUR LE DÉVELOPPEMENT INTERNATIONAL
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Review of
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1982

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The ability to look ahead, to plan for the future of one's family, is instinctive. It is also a sign of maturity, argued Dr Brock Chisholm, a Canadian and first Director General of the World Health Organization. Small children look ahead only a few weeks, said Dr Chisholm, while adults think of the prospects of future generations: of their own children and their children's children.

Planning is not restricted to individuals, of course. Entire societies and national governments plan for the future. Not all are equally successful, however, in taking the decisions necessary to ensure that their plans come to fruition. Nor are all the essential elements ever within the control of a single nation. A

IDRC President, Ivan L. Head, on the left, with Willy Brandt at the 1982 meeting of the Brandt Commission at the Centre's headquarters in Ottawa.

successful future is one that blends sound domestic decisions and practices with equally sound international processes and undertakings.

One of the domestic ingredients, certainly, is the conduct of research to ensure that local solutions can be found for local problems. One of the international ingredients is an awareness of the interdependence of all economies and all ecologies.

There were signs in 1982 that each of these ingredients is gaining strength. Developing countries increasingly are encouraging research activities within their own borders; and the international community has begun, however timidly, several important initiatives to strengthen institutional cooperation.

Research does not postpone decisions. Rather it ensures that decisions, when taken, reflect accurately and

wisely all the essential criteria. These include social and political factors that cannot be assumed or predicted from abroad. The advantage of locally pursued research is found in the increased experience and competence gained by local scientists, and in the assurance that local priorities, local concerns, and local biases are all adequately considered and weighed. Soil and climatic conditions cannot be replicated easily in far-away laboratories. Nor can cultural practices, which bear so heavily upon the effectiveness of preventive health programs, be thoroughly understood by persons of foreign origin and environment.

The resources available to the International Development Research Centre from the Parliament of Canada continued to expand in 1982 and, happily, the call upon those resources by scientists in developing countries grew apace. During the year, 261 new projects of a promising and often innovative nature were approved by the Centre's international Board of Governors.

A major contribution to governmental awareness of the interdependent nature of the world's economies was the 1980 Report of the Brandt Commission. The Commission gathered again in 1982 to examine international events since publication of its findings. In its final meeting, at IDRC's headquarters in Ottawa in December, the text of a new memorandum was approved, to be published early in 1983 under the title "Common Crisis." In his introduction to that document, Willy Brandt poses the essential question: "We reaffirm our conviction that change is inevitable. Will the world community take deliberate and decisive steps to bring it about, or will change be forced upon us all through circumstances over which the international community will have little control?"

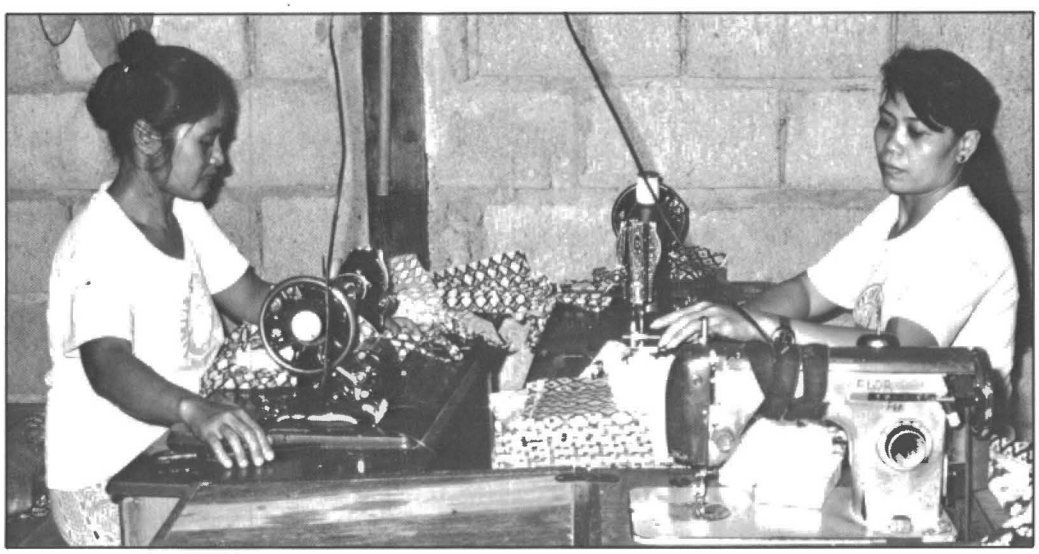
IDRC, modestly though effectively, is contributing both to change and to its wholesome management.

Ivan L. Head
President, IDRC

Engines of Growth

Agriculture is the key to countries' overall development, says the *World Development Report 1982*. According to this World Bank publication, "Economic growth has gone hand in hand with agricultural progress." Few countries, it notes, have achieved sustained economic growth without first — or simultaneously — developing their agriculture.

The relationship is complex. As subsistence farming gives way to marketed production, the scope of specialized marketing, transport, preserving, and processing is enlarged. Employment expands and diversifies. Activities formerly carried out on the farm — the manufacture of clothing and tools, house construction, processing, education, and medical care — become separate industries and services that open up new opportunities, many of them requiring specialized skills and training.



Cottage industries: as subsistence farming gives way to marketed production, employment expands and diversifies.

As incomes in agriculture are usually lower than in the "modern" sector, nonagricultural activities draw ever-increasing numbers of workers. This movement of labour from agriculture to industry and services is the key to raising incomes and production.

This process certainly occurred in the now highly industrialized countries of Europe and North America where a dynamic agriculture accompanied, or led, industrialization and economic growth. According to the World Bank, the same process is now occurring in developing countries. In the 1970s, developing countries with high agricultural growth rates also experienced high growth rates in their Gross Domestic Product (GDP) — Colombia, Indonesia, Kenya, Malawi, Tunisia, and Turkey were among those affected in this way.

There are many important linkages between agriculture and the rest of the economy. Expanding agricultural production creates a demand for fertilizers, transportation, commercial services, and construction. Agricultural households, which form the bulk of the population of developing countries, are also the basic markets for a wide range of consumer goods — from textiles to processed foods, radios to bicycles.

Agricultural growth does not occur spontaneously, however. It requires effective policies and institutions, supported by the application of research and technology to food crops, from the development of high-yielding varieties to better means of preserving the larger harvests. It also requires collaboration between public and private sectors. Farmers' efforts need to be supported by public action in the key areas of agricultural research and public investment, notably in irrigation, storage facilities, and transport infrastructures. Ultimately, however, it is the farmers who must take the risks in the hope of reaping the rewards.

Minimizing the risks while maximizing the rewards is at the heart of the preoccupations of the International Development Research Centre, most directly through its Agriculture, Food and Nutrition Sciences (AFNS) Division.

Starting from the premise that agricultural development is a process of evolution, assisted by human ingenuity and industry, the division's programs — like those of the Centre's other program divisions — stress the need to consult and cooperate with the people whom the research is intended to benefit. And it emphasizes the importance of a systems approach to research, ensuring that the physical, economic, and social climate in which people live and work is understood.

The importance of agriculture cannot be overstated: at least 70 percent of the population of developing countries draw their livelihood from agriculture. Higher production is not only essential to raising their incomes, but also to providing them with better nutrition. In the 1970s, agricultural production in developing countries did increase, by some three percent per year: but populations also grew rapidly. In many countries, the net gain in food per person was minimal, and millions of farmers did not share in the progress.

As new land for agriculture becomes ever scarcer and won at ever higher prices, further increases in production must come through intensifying production. Higher-yielding varieties, more productive cropping systems, better management of resources, and the careful integration of livestock, food crops, and trees — all must contribute. These are all major thrusts of the AFNS program.

But agricultural development alone will not alleviate the absolute poverty in which close to one billion people now live. The great majority of these people — over 90 percent — live and work in rural areas. Up to one-quarter of them are landless.

To help these people, specific programs of human development must be implemented. The elements of human development — health, education, nutrition, and fertility control — are closely interrelated. Improvements in one area facilitate and reinforce all aspects of development.

Two of IDRC's program divisions are concerned with these aspects of human development. The Health Sciences program seeks to develop better means of delivering medical care in rural areas, to improve water supply and sanitation services, and to find effective tools for combating major tropical and endemic diseases. And, because the problem of poverty has been linked to high population growth, safe, effective means of fertility control are also being studied.

Through its Social Sciences Division, IDRC supports studies on various aspects of the rural economy, from the impact of agricultural development projects to off-farm employment. Its education component seeks to find the least

Sperm inhibition research: the link between poverty and rapid population growth is complex.

Parents and children: schooling available to everyone.

costly, most effective means of making schooling available to both children and adults.

Recognizing that industrialization is under way in most developing countries, the division also supports research on science and technology policy to help decision-makers work toward a successful transition from agrarian to industrial economies. The population movements that ensue are also the object of research by the Social Sciences Division. And the support of research into the often accompanying industrial and occupational diseases is being increased by the Health Sciences Division.

Because policies and programs cannot be formulated without reference to valid information, the Information Sciences Division promotes cooperation among nations in the collection and dissemination of recorded knowledge, thus avoiding the wastage of scarce human and financial resources. In its support for information projects in the fields of agriculture, health, population, education, and economic planning, the division's work complements the Centre's other three program divisions.

Agriculture and nutrition, health and population control, education and appropriate policies, and information —

Cataloging in India: nations must share in the collection and dissemination of knowledge.

improvements in these areas can not only alleviate the worst aspects of poverty, but also create a momentum for sustained development; it is little wonder they are often referred to as the engines of growth.

Remarkable progress has been made in the past few decades. The rise in agricultural production confounded the predictions of widespread famine that were rampant in the 1950s and 1960s. Population growth is slowing and literacy rates are much improved.

Further improvements may prove more difficult, and more expensive. However, the application of appropriate policies and of scientific and technological development can ensure that they are realized.

How IDRC-supported research is helping developing countries achieve their potential, how the Centre is helping to fuel the engines of growth, is described on the following pages in a brief review of Third World research programs being supported by IDRC.

Agriculture, Food and Nutrition Sciences Program

Land improvement, new farming methods, better crop varieties, and more research are all necessary requirements for agricultural growth. But they will not succeed unless they take into account the people that they are intended to benefit and their social, economic, and physical environment.

That is why the Agriculture, Food and Nutrition Sciences Division of IDRC has, since its creation in 1970, concentrated most of its efforts in support of applied research for the benefit of rural people in developing countries. It has stressed the need to both consult and cooperate with the farmers, and it has emphasized the importance of a systems approach to research.

Neglected peoples, neglected crops, and neglected lands have received considerable attention in the projects supported by the division. The semi-arid regions of the world are the main focus of much of the division's project support, but improving the livelihood and productivity of rural peoples in quite different, equally neglected, regions is also stressed — the High Andes of Latin America, for example.

During 1982, 63 new projects were initiated by the division, totaling some $16.5 million in grants. They are divided, by discipline, into five sectors:

- Crops and cropping systems: Emphasized are foods such as cereals, legumes, oilseeds, and root crops that provide most of the food energy and nutrients for the majority of people in developing countries. Other areas of concentration include multiple-cropping systems, fertilizer efficiency, and the control of weed and insect pests.
- Fisheries and aquatic resources: The greatest emphasis is on the aquaculture of finfish, shellfish, and aquatic plants. Studies also include the control of fish parasites and diseases, the development of artisanal fisheries, and the management of coastal ecosystems.
- Forestry: Trees not only provide food and fuel, but also play an important role in soil and environmental conservation. The program therefore emphasizes reforestation, the creation of village woodlots, tree improvement, and forest-products utilization.
- Animal sciences: Integrated animal production systems for small farmers and pasture improvements are stressed. High priority is also given to native animal species and the use of agricultural by-products as feed.
- Postproduction systems: Focused on the total sequence of events from harvest to consumption, the program emphasizes food conservation and processing. Great attention is paid to the nutritional needs of consumers.

In carrying out its program of work, the division has contributed to specific programs within the international agricultural research centres and was a founding member of the Consultative Group on International Agricultural Research (CGIAR). In those areas where no relevant agricultural centre exists, project networks have been established to ensure the sharing of information. Some fundamental studies are also supported, most often at Canadian institutions in cooperation with Third World scientists.

Joseph H. Hulse has been the Director of the Agriculture, Food and Nutrition Sciences Division since 1970.

The Year in Review — The World Bank predicts that food demand will increase by at least one-third in the next decade. For the more than 100 countries that are already food importers, and lack the foreign exchange for greater imports, concerted action is urgently needed to increase domestic production.

The approach that holds the best promise for increasing food availability is producing more per unit of land through the use of higher-yielding varieties and improved agronomic practices. Thus, the AFNS Division has emphasized research on crops and cropping systems.

The protein in food legumes, in part because of its high lysine content, is complementary to that of cereal grains. When eaten together, legumes and cereals provide excellent nutrition. Efforts to increase the production of these important foods continued during the past year as a number of legume projects entered a second or third phase of activity.

In Upper Volta, for example, high-yielding varieties of cowpeas that resist diseases, insect pests, and drought have been selected and are now being tested on farms. At the International Center for Agricultural Research in the Dry Areas (ICARDA), based in Syria, work is continuing on the breeding of resistant and

Research into high-yielding varieties of cowpeas: the quest for excellent nutrition for all.

high-yielding varieties of chickpeas, lentils, and faba beans. The results of this regional program will be demonstrated and adapted to the countries served by ICARDA, from Bangladesh in the east to Morocco in the west.

In Mozambique, groundnuts are grown for food and sale by half the population. Research to increase production and yields, begun three years ago, entered a second phase this year. The project will now benefit from a new regional project based in Malawi. It is carried out by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), which has the world responsibility for groundnut improvement.

The protein in oilseeds is also nutritionally complementary to that of cereals, but oilseed production is inadequate to meet the needs of developing countries. In Egypt, researchers completed the first phase of a project to breed better varieties of sesame, sunflower, groundnut, and rapeseed. A new project to improve oil crops in Ethiopia's lowlands was also approved this past year.

In many countries, root crops such as cassava, sweet potato, and yams are the major sources of food, or are grown as insurance against failure of other, riskier crops. In Liberia, researchers are working on realizing these crops' potential by breeding varieties that are resistant to common pests and diseases and are adapted to the country's wide range of environmental conditions. A similar approach is being followed in Rwanda, the most densely populated country in Africa.

A combination of root crops, cereals, and legumes is the focus of a large collaborative project in the High Andes of Peru. During the first phase of the project, considerable progress was made in understanding traditional crop-production systems and in introducing improved varieties of field crops. In a second phase, begun this year, trees and fruit crops will be included.

A second phase was also approved for a project being carried out by the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) in Costa Rica to evaluate drought-resistant crop varieties and design agricultural technology for small farms in the semi-arid regions of Central America. In the humid lowlands of Central America, root crops and plantains are the major food sources, but until recently these crops were largely neglected in favour of export commodities. With the establishment of CATIE in 1973, this trend has been partially reversed. Several CATIE projects have been supported by IDRC, including a new one to develop cropping systems for

yams, cocoyams, sweet potatoes, and plantains.

Plantains are a banana, a plant that originated in Southeast Asia. In the Philippines, small farmers grow 90 percent of the banana crop. To improve their production, researchers have begun a three-year project that will establish a tissue-culture laboratory, evaluate promising varieties, and develop banana-based cropping systems.

Developing improved varieties of crops is only one thrust of the crop sciences program. Equally important is the establishment of more-productive cropping systems. A number of projects entered a second or third phase this past year in Bangladesh, Colombia, Mali, Syria, and Thailand. An outreach project is also adapting the results obtained at the International Rice Research Institute (IRRI) on rice-based cropping systems to the needs of many Asian countries, including Burma, Nepal, and the People's Republic of China.

Marginal lands that will not support food crops can be made to yield much-needed protein. A number of projects have shown that animals, ruminants in particular, can be pastured in areas unsuited to crop production, or can subsist on agricultural wastes. Although most research on animal production has been carried out in Latin America, a new project was launched in the Philippines where goats are gaining popularity as a "backyard crop." To solve the problem of feed shortages during the dry season, researchers are evaluating the use of leaves from the leguminous *Leucaena* tree. Feed availability is also an important component in a new dairy-farming project in Tanzania. A detailed account of the animal sciences program can be found on page 12.

Expanding aquaculture also holds great promise for increased supplies of animal protein and the division has supported more than 50 projects aimed at fostering the cultivation of aquatic plants and animals. Many of these projects have been carried out in Southeast Asia. In the Philippines, where milkfish were being reared in ponds some 450 years ago, before the arrival of the European explorer Ferdinand Magellan, IDRC is actively supporting research to help solve the shortage of milkfish fry. The success achieved in getting the milkfish to breed in captivity is documented in a new IDRC film (see page 40). The project is continuing, in a third phase, to standardize the production of fry and to develop effective methods of pond management.

Cageculture — the raising of native fish species in large cages immersed in ponds, lakes, rivers, and canals — is particularly promising for many regions. In Sri Lanka, cage systems are being developed for lagoons and irrigation tanks. Now starting a second phase, the project will disseminate the technology among farmers and fishermen. A second-phase project is also under way in the Dominican Republic where cageculture of *Tilapia* and carp has proven practical and profitable.

Harvesting milkfish in the Philippines: closer to the promise of animal protein from aquaculture.

In the Caribbean, diversification of the fishery industry is being emphasized.

Researchers in St. Kitts–Nevis began in 1982 to develop methods of growing molluscs in protected bays. In Jamaica, biological studies and development of basic technology for oyster culture were completed and a second phase of the research started this year to build a self-sustaining industry.

Food availability can also be greatly increased through improved methods of conservation, processing, and distribution. In many countries of Africa, lack of adequate means of processing has limited the expansion of production of native cereals such as sorghum and millet, as well as of legumes. A number of projects have shown that a small abrasive dehuller could be adapted to effectively dehull tropical cereals and legumes. The dehuller was developed by the Prairie Regional Laboratory of Canada's National Research Council, in collaboration with scientists in Nigeria, Sénégal, Ghana, the Sudan, and Botswana. Two new projects are now introducing the dehuller to Zimbabwe and Ethiopia. In Botswana, the dehuller has proven successful at a pilot mill and researchers are now optimizing the design and improving the manufacturing process.

Postproduction research in Asia has focused on rice, and a network of projects is continuing the search for improved dryers, threshers, dehullers, mills, and storage facilities. Because the postproduction technology of other food crops has been neglected, new projects are concentrating on sweet potatoes in the Philippines, groundnuts in Thailand, and fruits and vegetables as well as rice in Bangladesh.

The third project of a series to apply research methodologies to important small-scale food industries was supported this year. In Chile, bread-making is the largest food sector and researchers have begun a comprehensive study aimed at improving the quality of the product from family-run bakeries. Also in Chile, a new project will develop a small fish-processing industry for coastal villages. The development of this artisanal industry will have a second benefit: providing low-cost, high-protein products for use in the country's school feeding program.

The AFNS Division, long a recognized leader in the field of social forestry, is expanding its forestry program. Two of the rapidly growing research networks deal with bamboo and rattan. New projects have been launched in Thailand and China to increase the production of these versatile materials and establish collections of the most useful species. A similar project was initiated in the Philippines.

Also in the Philippines, researchers completed the first phase of a project on *Leucaena* and are continuing the development of this tropical legume for the production of wood, fuel, forage, and fertilizer. Another leguminous species, *Erythrina*, is being studied in Costa Rica.

In Nepal, large-scale deforestation, which has led to fuel shortage and soil erosion, is creating hardship for rural people. Researchers are now selecting the best tree species for farmers to plant as a source of fuelwood, fodder, green manure, and timber. Similarly, in Zimbabwe, another project aims to establish plantations in arid and semi-arid zones, both to protect the natural forests and to provide a much-needed source of firewood.

The division also continues to support the International Council for Research on Agroforestry (ICRAF) and sponsors training seminars for young forestry research workers.

The Animal Connection

"Sheep eat men." So said peasants in 17th century England after being thrown off common lands to make room for private fenced pastures. Today, livestock are more often described as "reverse protein factories," consuming more protein in the form of cereals than they produce as meat.

It is true that animals consume 500 million tonnes of grain each year — one-third of the world's production and enough to feed 2.5 billion people; but the issue is not that simple. Most of that

consumption takes place in industrialized countries where cereal markets would be reduced drastically were it not for the livestock industry. In developing countries, 80 percent of cereals are still consumed directly by people.

Animal production is growing in developing countries in response to both increased population and increased demand. Studies by the International Food Policy Research Institute (IFPRI) clearly indicate that, as nations develop and as their Gross National Product (GNP) increases and more money finds its way into the pockets of their people, the demand for meat increases.

Animals provide more than meat. In many cultures, they are capital, security, prestige, and social currency. They also provide a host of products — leather, wool, and down — that are money-earners. Cattle dung provides both fuel and fertilizer. Draft animals are a source of energy for small farms in most developing countries. Animals can also make good use of, and even improve, marginal lands that will not support crops, and can convert agricultural and other wastes into food.

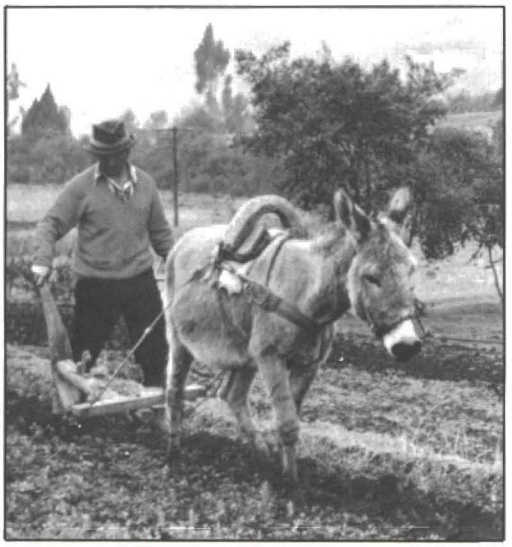
Despite continuing increases in production, however, developing countries are not as a rule very efficient in their animal production systems. Africa, Asia, and Latin America have two-thirds of the world's cattle, but they produce only one-third of the meat. They have just over half of the world's dairy cows, hens, and pigs, but they produce only one-quarter of the world's milk and a little more than one-third of the world's eggs and pork.

Ways must be found then to increase production without necessarily increasing the number of animals. That is the mandate of the animal sciences program. In the past 10 years, some 65 projects have been supported under the program.

A number of these projects have demonstrated that, in integrated farming systems, animals can subsist on pastures grown on marginal lands, supplemented by raw and processed agricultural by-products unsuited for human consumption. Half of these projects have been in Latin American countries, reflecting the importance of animals in the region's farming systems.

Of the program's three main thrusts — pasture improvement, by-products utilization, and animal production systems — the last is now receiving the greatest emphasis.

Animal production systems could equally well be called animal–crop systems. Farms that combine crop and animal components are, in fact, the dominant systems in most developing countries and the interactions between crops and animals have a major impact on the productivity and efficiency of the farm. Some interactions are direct: crops and animals compete for land, labour, and capital; crop residues are fed to animals; animal power is used for cropping activities; animal manure is used as fertilizer; and forage crops are combined with food or cash crops. Maximizing the benefits of these interactions is what the program is all about.



In developing countries, animals provide more than meat.

A network of research projects now extends from the Peruvian Amazon into Central America. And, although the local conditions and specific objectives vary, the basic methodology that they follow is essentially similar: each project begins

with a detailed study of the existing production systems and the identification of the farmers' constraints; alternative, improved management methods are then developed, evaluated, and demonstrated to farmers.

Panama, for example, imports more than half of the milk consumed in the country. Sixty percent of domestic production — some 42 million litres — comes from more than 30 000 small farms that also produce beef. Production on these farms is low because of poor pasture management and lack of feed supplements for the cattle.

The animal science team at the Instituto de Investigación Agropecuaria de Panamá (IDIAP) believed that livestock production in Panama could be increased considerably by developing improved feeding systems for these small dual-purpose farms. The new systems would be based on the existing "faragua" grass pastures, but complemented with legumes, by-products, and forage conservation techniques to make feed available during the dry season. IDRC supported their efforts in 1977.

A diagnostic study of producers in three regions of the country helped the team to identify production constraints. After several studies, promising techniques were developed for pasture management and dry season nutrition. During the first two years of the project, the improved feeding systems resulted in a 70-percent increase in milk production in the experimental herd.

The research is continuing to evaluate and further refine improved dairy–beef production systems for the three regions. A close working relationship has developed between the researchers and the farmers.

The Panamanian team receives technical assistance from CATIE in Costa Rica, the coordinator of the research network, where tropical crops and crop residues in the feeding of dual-purpose cattle has been studied since 1976.

Problems differ in the Peruvian Amazon where migrants are settling in forest clearings and destruction of the vegetation causes rapid loss of soil fertility. Appropriate combinations of pasture grasses and forage legumes would protect the cleared lands, improve soil fertility, and sustain the cattle population while providing employment, food, and income for the settlers. Increased livestock production would also reduce the heavy reliance on imported meat and milk.

In a project begun in 1979, scientists from the Instituto Veterinario de Investigaciones Tropicales y de Altura (IVITA) are endeavouring to introduce pasture grasses and legumes and establish efficient management practices. Similarly, in Guyana, the emphasis is on establishing pastures and on using local by-products to increase milk production. The project benefits from the results of an earlier IDRC-supported project carried out in three West Indian countries that identified adaptable and productive forage grasses and legumes.

From Latin America, the animal production systems network has reached out to the Philippines and Tunisia and, during 1982, to Tanzania and Zimbabwe. All these projects stress native rather than exotic breeds of animals whose production is integrated with food and perennial tree crops, pasture grasses, and leguminous browse trees.

These projects are complemented by the tropical pastures network, by work being carried out around the world on by-products, and by a new program on minor species — from bees to camelids. They can all help increase the supply of animal protein in developing countries, where it is most needed, without adversely affecting the production of other valuable food crops.

Health Sciences Program

In 1980, inhabitants of low-income countries could expect to live an average of 57 years; they would see close to 11 percent of their children die before their fifth birthday; and six thousand of them depended on one physician for their care. Dismal though these figures may appear, they are better than in 1960 when life expectancy was 42 years, infant and child mortality was 19.3 percent, and one physician cared for close to nine thousand people.

Despite these improvements, however, it is clear that the fundamental right to health is still denied to a large part of humanity. It is to help find ways to improve this situation that the resources of IDRC's Health Sciences Division are being put to use.

The goal of the division is to help developing countries provide a better standard of health for their people. It emphasizes those areas where it feels the application of research results — and the resulting stimulus to local research capability — can have the greatest impact.

The division also participates in major international research efforts such as the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, the WHO Global Diarrheal Diseases Control Programme, and the work of the International Committee on Contraceptive Research (ICCR).

Some 17 percent of the Centre's project budget was appropriated by the Health Sciences Division in 1982. Close to $6.9 million was allocated to 41 new projects in the following areas:

- Communicable and noninfectious diseases: The fastest-growing of the division's programs, it emphasizes diarrheal and tropical diseases and studies of the relationship between malnutrition and infection as well as other key health problems such as tuberculosis and acute respiratory illness in children.
- Fertility-regulation methods: Broadened to include social obstetrics and studies of the effects of poor nutrition on mother and child, this program focuses on the development of safe, reliable methods of contraception and on studies of their effects on health, it also includes studies on sexually transmitted diseases.
- Rural health-care delivery: Studies of rural health-care needs, training and personnel requirements, and the cost-effectiveness of programs are stressed. Also included are delivery systems for basic health care such as oral rehydration therapy.
- Water supply and sanitation: The social, educational, and training aspects of such programs are being emphasized along with the development and evaluation of simple, effective technologies for rural areas.
- Occupational health: The health problems of workers in both industry and agriculture are the focus of this recent program.

Elizabeth J. Charlebois was appointed director of the Health Sciences Division in 1982. A sectoral reorganization has taken place and previous activities have been regrouped and expanded into the following four sectors: Tropical and infectious diseases; Maternal and child health; Water supply and sanitation; and Occupational and environmental health.

The Year in Review — "The last few decades have not been altogether favourable ones for world health," says the World Health Organization's *Sixth Report on the World Health Situation*, citing the proliferation of climatic calamities, wars and civil unrest, population growth, inflation, and dangerous chemicals.

Yet progress is being made. Large global programs, such as the Special Programme on Tropical Diseases, are yielding information on the epidemiology of hitherto little-understood tropical diseases, and are developing better diagnostic tools as well as safer, effective means of treatment. IDRC supports

the work of the Special Programme, but it also funds directly individual projects with complementary aims.

This year, a new project was launched in Colombia where *Leishmaniasis*, a parasitic disease transmitted by sand flies, poses a major health problem. Because some forms of the disease are resistant to therapy and relapses are frequent, the researchers are examining the relationship between the clinical forms of the disease and response to therapy.

Many diseases endemic in tropical areas are not covered by the UNDP/World Bank/WHO Special Programme. One of these is dengue hemorrhagic fever, widespread in Southeast Asia and the South Pacific. Although a less-virulent form is common in the Caribbean, there was an epidemic of the severe form in Cuba in 1981. Researchers are now examining the factors that may have contributed to the epidemic. This project complements other Centre-funded projects in Asia that seek a better understanding of this disease.

The most common causes of illness and death in young children in developing countries are diarrhea and acute respiratory infections (from the common cold to pneumonia). In India, for example, acute respiratory infections are responsible for up to 40 percent of illnesses and 30 percent of deaths in children. Over the last two years, IDRC has worked closely with international health bodies and research institutes to develop a research protocol for the study of these infections. In 1982, the first three projects were supported. The two in India, in different locations, will examine the causes and outcome of these diseases in children and the information they provide should help develop effective means of treatment. A similar project was also launched in the Caribbean.

Under the leadership of the WHO's Expanded Programme for Immunization, increasing numbers of children are being vaccinated against childhood diseases. The results of many of these programs are disappointing, however, and a number of immunized children are still contracting polio, measles, diphtheria, whooping cough, and other diseases. Studies have pointed to malnutrition as one of the causes for the failure of immunization. Preliminary findings from an IDRC-supported project in Colombia indicate that mildly malnourished children have a lower immune response when vaccinated against diphtheria, tetanus, and tuberculosis than well nourished children. A new study begun in 1982 will follow the same children for a further three years to determine the incidence and severity of diseases and see how this relates to their nutritional state.

Over the years, the division has supported several projects in different parts of the world to determine the causes and patterns of diarrheal diseases. Several projects are also developing and evaluating programs to promote the use of oral rehydration salts to treat children. Following a project in Southeast Asia, simple educational materials explaining to mothers the proper use of oral rehydration are now being disseminated in three countries. A second phase of the project will now evaluate the impact of the materials and prepare others for educating physicians and medical personnel. To solve the problem of the expensive packaging needed to protect the salts from moisture, a different formulation will also be tested.

In Trinidad, the success of oral rehydration therapy has been confirmed during the first phase of a project. A second phase was launched this year to expand the pilot program and launch an educational campaign.

Diarrheal diseases occur most frequently when infants are weaned from breast milk to other foods. Although the contamination of milk formulas has received considerable attention, little research has been carried out on weaning foods. Researchers in Peru are studying the relationship between diarrhea in infants and the foods they are fed.

The search for effective, inexpensive ways of bringing health care to rural populations also continued this year. In one province of the Philippines, mobile nursing clinics serve isolated populations. A grant was approved to enable researchers to assess how effective the clinics are. In Indonesia, nurses are being trained to meet the health needs of rural populations. Their training and effectiveness are now being evaluated.

The lack of trained personnel has been identified as a major constraint to the implementation of water-supply and sanitation programs. To help solve this problem in Indonesia, a project is being supported that will design, implement, and evaluate a training program for water-supply personnel working in rural areas of the country.

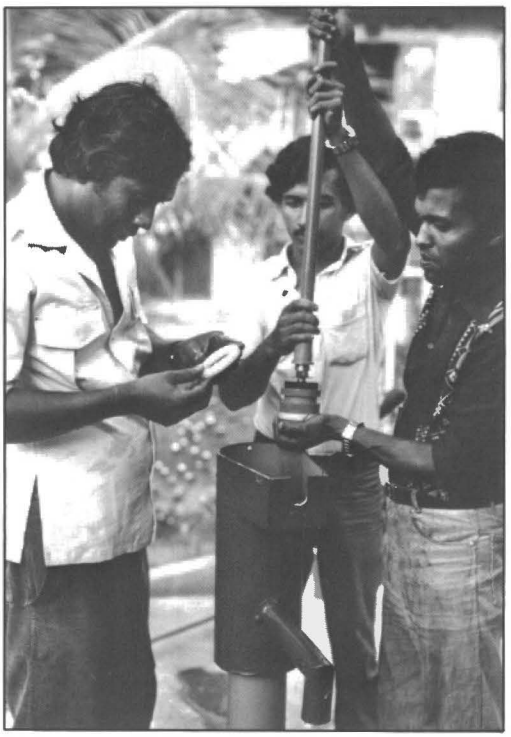
Villagers are being educated about the health hazards posed by poor sanitation and strategies are being developed to promote community participation in projects in Sénégal, Sierra Leone, and the Gambia. The impact of new latrines and wells will also be measured. In Indonesia, a new project will seek to examine the impact of sanitation on preventing parasitic infections.

In August, researchers involved in four Asian projects testing village handpumps met in Malaysia to review the results of their work. They concluded that the polyvinyl chloride (PVC) pumps could be manufactured locally and were efficient and easy to maintain. The results of these projects are presented in *Village Handpump Technology*, published late this year (see page 40).

Sexually transmitted diseases (STD) continue to spread unabated throughout the world. Little is known, however, about their incidence in developing countries where the lack of facilities for diagnosis and treatment makes the populations of these countries particularly vulnerable. New projects launched this year in Brazil, Jamaica, Nigeria, and Thailand will seek to develop effective treatments for the control of gonorrhea, one of the most common STDs.

Reflecting the growing industrialization of many developing countries, the number of occupational-health projects grew substantially this year. In Hong Kong and Indonesia, the incidence of *byssinosis*, a lung disorder associated with the textile industry, is being studied. In India, the health of coal miners is being assessed to recommend improvements in their working conditions. In the Sudan, the flour-milling industry is the focus of a project that will study the link between hypersensitivity to flour dust and respiratory diseases.

Two other projects are investigating accidents and injuries in a variety of Korean industries and in banana plantations in Honduras.



The polyvinyl chloride pump: implementing critical water-supply and sanitation programs.

Fertility: A Family Concern

It took 35 years for the world's population to grow from two to four billion. Reaching six billion should take 25 years and, by the year 2000, the population of

developing countries alone will number 4.8 billion.

Despite dire Malthusian predictions, the rate of population growth in developing countries is slowing down, from 2.4 percent annually in 1965 to 2.2 percent today; probably due to education, improved health conditions that increase children's chances of survival, urbanization, and accrued employment opportunities.

The interrelationships between population growth and socioeconomic factors are exceedingly complex, especially because decisions about family size are not made by governments and large organizations, but by millions of individuals, motivated by often quite intangible factors. The role of governments is to promote improvements in living conditions that may motivate families to want fewer children, and to provide the means for them to make their choice effective.

During the past two decades, most developing countries have launched active family-planning programs to do just that, but not all have met with the hoped-for success. One of the reasons is that continuation rates for contraceptive users remain low. Fears about the safety of some contraceptive methods, or the inconvenience of use, lead many to abandon them. The improvement of existing fertility regulation methods and the development of new ones are therefore a priority.

Much of this work is carried out by the International Committee on Contraceptive Research (ICCR), a consortium of scientists formed in 1971. Through ICCR's activities, several new contraceptive methods have enjoyed wide distribution, including the Copper-T intrauterine device (IUD).

Now, after more than a decade of research, two new versions of the Copper-T are ready for distribution. Called the 380A and the 380Ag, their advantages are greater effectiveness and fewer side effects than other IUDs. IDRC, which has supported the work of the ICCR since 1974, this year approved a project to promote actively the introduction of these new devices in the countries where they are most needed.

Oral contraceptive pills rank among the most widely used of family-planning

Decisions about family size are not made by governments, but by individuals.

methods. Recent studies, however, have pointed to a number of risks associated with long-term use. In an effort to reduce these risks, several countries are selecting low-dose products, carefully screening users, and educating both users and the staff of family-planning clinics. In Mexico, where pills are widely used, researchers are now carrying out a survey to determine the awareness of family-planning personnel to the possible problems, and to gauge their ability to screen patients effectively.

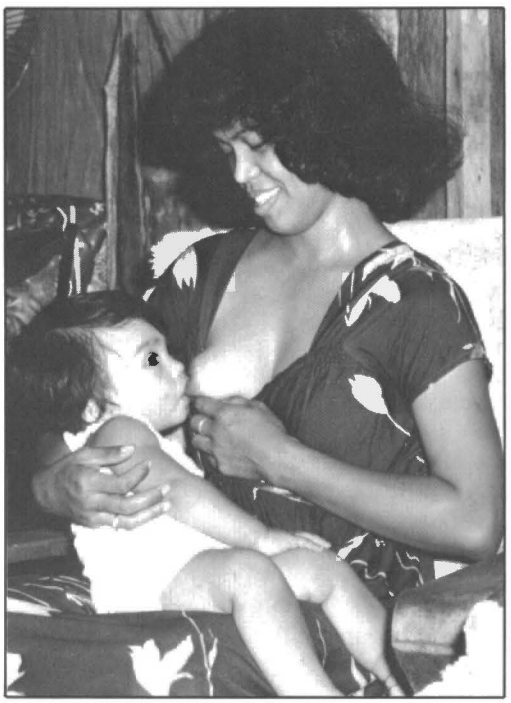
A more-recent contraceptive development is the long-term hormonal implant, Norplant. The division has supported acceptability studies of the implant in Ecuador, Indonesia, India, Egypt, and Thailand, as well as the development of educational materials for users and health personnel. In Indonesia, Norplant has proven effective and was well accepted by a sample of women. A wider trial involving 10 000 women was launched this year with a view to introducing the implant into the country's family-planning program.

An area neglected by researchers until recently has been the development of male contraceptives. One of the constraints in developing new male methods is the lack of understanding of the male reproductive system. Halting male fertility is biologically difficult: up to a billion sperm are produced daily and controlling or stopping this proliferation is difficult.

One approach to male contraception would be to alter the sperm's ability to fertilize the ovum, which could be done by inhibiting or preventing their maturation. A project in Thailand has indicated that there may be a factor in the epidydimis — the set of long cord-like ducts immediately behind the testes — that maintains the sperm in a nonmobile state. The sperm become mobile as they leave the epidydimis and this mobility is essential for fertilization to occur. If this quiescent factor, as it is being called, could be identified, it might provide the basis for a male contraceptive. A second phase of the research will enable the researchers to pursue their investigations.

The maturation of spermatozoa is also being studied in Kenya where a new project is investigating the hypothesis that delaying the sperm in its passage through the epidydimis would bring about a loss of fertility. A project in Chile is aimed at providing contraception by preventing the sperm from penetrating the ovum. The research focuses on the role of two enzymes that enable sperm to travel through the female reproductive tract and penetrate the ovum's protective barrier.

Although these and other projects deal specifically with contraceptive development, IDRC's fertility-regulation program has become much broader in scope. A number of projects, for example, are looking at the oldest and possibly the most widely used means of contraception — breastfeeding.



Breastfeeding: health and emotional benefits for both mother and child.

The health and emotional benefits of breastfeeding for both mother and child are being increasingly recognized, but its contraceptive effect has been

neglected. Breastfeeding prevents fertility after childbirth as the stimulation of the baby's suckling promotes the secretion of hormones that delay the return of ovulation. This infertility, called lactational amenorrhea, is still little understood and varies widely from woman to woman. Researchers in Mexico, for example, noted that it lasted up to 10 months in urban areas and up to two years in rural areas. They are now studying the relationship between breastfeeding patterns and amenorrhea. A similar project in Egypt determined that the length and intensity of the breastfeeding period affected the duration of amenorrhea.

Because breastfeeding is not a reliable long-term contraceptive, however, many new mothers turn to other forms of contraception, some of which interfere with lactation and are of doubtful safety for the child. Researchers in Chile have found that natural progesterone pellets do not affect lactation and are both effective and safe. The research is now continuing to improve the pellets and develop other means of administering the hormone.

The program has expanded in recent years to include what could be called "social obstetrics" — studies that aim to improve the health of mother and child during pregnancy and after childbirth. This past year, two new projects were launched. In Brazil, researchers are looking at the cause of illness and death in babies during the last stages of pregnancy and immediately after birth. In Malaysia, the research is focused on the health care of the mother-to-be. These projects should help planners develop effective maternal- and child-health services.

Both women and babies are at greatest risk from sexually transmitted diseases (STDs). Gonorrhea, for instance, results in pelvic inflammatory disease in 20 percent of infected, untreated women. Sterility, ill health, and ectopic pregnancy are frequent consequences. Children born to a woman with gonorrhea may develop serious eye infections, sometimes leading to blindness.

Control of gonorrhea as well as other common STDs in developing countries is hindered by a lack of facilities and personnel for diagnosis and treatment. As mentioned earlier, the division has been supporting research to provide epidemiological data and develop effective treatments for STDs in Latin America and Africa.

Information Sciences Program

About four years ago in Argentina, a major United Nations conference on technological cooperation among developing nations advocated the sharing of information as a means of promoting development. By doing so, countries could avoid the duplication of effort and the wastage of scarce human, and even scarcer financial, resources.

Helping policymakers and scientists in developing countries in this task through the establishment of better information systems and services for the collection and processing of information is the mandate of IDRC's Information Sciences Division.

The division is guided by the belief that the world's volume of new scientific literature is too enormous for any one country to build an independent, all-encompassing information system. Equally, the most important information for a country is that produced within its own boundaries or selected for relevance to its own needs.

A large part of the division's efforts has been directed toward the building of cooperative bibliographic systems and services. To reflect changing needs and technologies, however, it now supports activities in such areas as computer conferencing, the development of computer software for research applications, and a variety of means of disseminating research results.

Underlying the division's efforts with more visible aspects of information sharing, that is hardware and software, is a concern with social issues. For instance, in the past year, there has been much interest in improving services related to public administration — the civil service function in various levels of government and in state enterprises.

Another example is "women's issues." The division participated at a major international conference in Montreal in 1982, where the need for appropriate information programs on this issue was identified. The division is now keenly awaiting the identification of the institutions that will be responsible for these programs, and the direction that they will take.

The division's main areas of concentration include:

- Support for international cooperative information systems in which developing countries can participate, contribute, and benefit;
- Support for specialized information analysis centres dealing with specific topics of importance to development efforts;
- Library development and the operation of IDRC's own library, information, and micrographics services;

Information: underlying the hardware and software is a concern with social issues.

- Computer science, particularly the application of data-base management systems for the storage and retrieval of information;
- Promotion of compatible information-processing methods so that information can be shared readily;
- Extension services, especially for small-scale industries;

- Cartography, in particular the use of satellite data to produce thematic maps; and
- Application of improved telecommunications to facilitate information exchange among developing countries.

In its support of information projects in the fields of agriculture, health, population, education, and economic planning, the division is very conscious of the work of the Centre's other program divisions.

In 1982, 21 new projects were initiated by the division, in addition to those managed within IDRC as continuing activities. The projects approved totaled $4.15 million, or some 10 percent of the Centre's project budget.

John E. Woolston has been director of the division since its inception.

The Year in Review — "Knowledge is power," wrote Francis Bacon close to four centuries ago and this is increasingly true as vast resources are expended each year on collecting information on research and development. It is difficult, however, for the many developing countries that lack human, technical, and financial resources to tap into the world's pool of information.

To assist developing countries, the Information Sciences Division has stressed making "information for development" available through the support of international cooperative information systems in which all members contribute the information produced on their territory, and share equally in the total.

The best known of these systems is probably AGRIS, the International Information System for Agricultural Sciences and Technology, coordinated by the Food and Agriculture Organization of the United Nations (FAO). Centres participating in AGRIS may do so individually or may concentrate their efforts and resources by acting through regional centres. In Latin America, the AGRINTER network — Sistema Interamericano de Información para las Ciencias Agrícolas — based in San José, Costa Rica, carries out this function.

Support for AGRINTER continued in 1982 with funding for the implementation and operation of computerized systems at institutions in five countries, thus increasing access to the AGRIS and AGRINTER data bases for agricultural research in Latin America.

Where there is no regional centre or network, national efforts need to be supported and reinforced. In Jordan, for example, a poor infrastructure for information was identified as a constraint to increasing agricultural production. This information gap should now be narrowed with the establishment of a new system to organize national agricultural literature and to facilitate participation in AGRIS.

Also in agriculture, a project was funded this year in Kenya to test a computer package designed to help researchers get the most out of agroforestry projects. Called MULBUD (multi-crop, multi-period budgeting), the microcomputer software package can be used to formulate and evaluate cropping plans.

In the mid-1970s, IDRC took the lead in the field of socioeconomic information by designing a global system known as DEVSIS, the Development Sciences Information System. DEVSIS has not been implemented on a global scale, but a number of important development information systems have been launched. The most significant were set up by the UN Regional Economic Commissions: INFOPLAN, the Information System for Planning in Latin America; CARISPLAN in the Caribbean; and PADIS-DEV, the economic and social component of the Pan-African Documentation and Information System in Africa. PADIS-DEV entered a second phase this year to train member countries wishing to participate in the Pan-African network. At the national level, a project in Guinea will help improve the documentary infrastructure by training staff and setting up the national coordination centre as an affiliate of PADIS.

IDRC itself has operated an experimental DEVSIS program since 1976, identifying appropriate documents in

Canada and receiving inputs from a number of countries. Participants from the UN Regional Economic Commissions met in 1981 to discuss actions that would support their activities and lead to effective exchange of data. One of their recommendations was to accept an offer from IDRC to produce a model manual detailing the methods to be used in DEVSIS-type systems. The resulting *Manual for the Preparation of Records in Development-Information Systems* was published this year (see page 40).

The division's efforts to strengthen national institutions participating in regional programs also continued this year. In Brazil, a grant has enabled the state of São Paulo to obtain the methodology and software needed to establish a population-documentation centre, linked to the Latin American regional population information system, DOCPAL. The project has already resulted in the publication of the first issue of the Brazilian population index, DOCPOP.

Building cooperative information systems across national boundaries entails a significant effort in organization and training. It makes sense only when the topic covered is broad — "agriculture" and "population" for example. However, what is often needed is more narrowly focused information, tailored in response to an inquiry, in the client's own language. Such services require close collaboration between scientists and information specialists.

Over the years, IDRC has made grants to a number of such specialized information analysis centres, on topics as varied as cassava, ferrocement, water buffaloes, and rural youth programs. All are located in centres of excellence in their field. Two new centres were created this year. The Bananas and Plantains Information Centre (BAPIC) in Panama will be the fifth centre dealing with a specific crop. Through the two-year project, the Union of Banana Exporting Countries will expand its documentation and information services to serve the needs of all producing countries.

Through the establishment of the International Centre for Diarrhoeal Disease Research in Bangladesh (ICDDR,B), the Diarrhoeal Disease Information Service and Documentation Centre (DISC) will attempt to bridge the information gap that exists in this critical area of health research. The new centre will focus initially on Asia, and will assist researchers and practitioners through a variety of services including bibliographies, newsletters, a question-and-answer service, and a directory of personnel.

A small documentation centre on food and nutrition in Africa was also supported in Sénégal, and the Environmental Sanitation Information Center in Bangkok began a second phase of activity.

Bananas and plantains: creating an information centre for a specific crop.

In October, representatives of a dozen specialized information centres supported by IDRC met in Ottawa to identify common problems and make recommendations to donors. Among their main

concerns was the problem of funding. Many felt that the time-fixed grants provided by donors hindered efficient management. If the funds were provided in the form of an endowment, without time limit, they would be able to husband them, spreading their application over a longer period, thus escaping from the recurring spectre of what to do when the project ends. The division is studying their recommendations.

A project for the development of an infrastructure was approved at the Ministry of Information in Barbados. The objective is to enable it to implement a new model for a national information system to organize the country's libraries and information centres into the Barbados Library, Archive and Information Centre Network, BLAIN. In Costa Rica, a feasibility study on the establishment of an information system for export promotion was launched. And to help improve China's science and technology information services, a management course for senior personnel was funded at the Institute of Scientific and Technical Information.

The network of IDRC-supported thematic mapping projects was extended this year to Kenya where the Regional Centre for Services in Surveying and Mapping will initiate a photomapping project for the benefit of eastern and southern African countries. Like other similar projects described in *Remote Sensing and Development*, published this year (see page 39), it will use data provided by remote-sensing satellites.

Also in East Africa, a new project developed in cooperation with IDRC's Communications Division will provide technical support to three research organizations to help them plan and implement publications programs for the dissemination of their research results.

The Information Sciences program differs from those of the other divisions in that, in addition to project activity, it also funds and manages a number of in-Centre projects such as IDRC's library. The library acts as a major resource for Centre staff and for development scholars in Canada. Some 50 institutions across Canada now have computer access to the library's data bases. Some of these data bases have been developed by in-Centre projects such as SALUS, a bibliography with abstracts on low-cost rural health-care delivery.

Many of the requests received by the division are not for funding but for professional advice, training in the establishment of systems, computer software, and preparation of operating manuals. Very often the requests are for the time of division staff. In view of these increasing demands, a "Systems and Methods" group has been established to provide a pool of experienced personnel to fill these requests. This group will help identify mechanisms by which libraries can better cooperate with each other and work on the development of nonbibliographic software. It may also provide assistance in the area of computer conferencing. Following a workshop held in Ottawa in 1981 (see page 39), growing interest is being expressed in the use of digital telecommunications as a development tool.

Division staff also spend a good deal of time responding to the needs of users of MINISIS, the Interactive Minicomputer System for Information Retrieval and Library Management, the software package that was developed by the Centre for the management of data bases. Of the close-to-60 MINISIS users, two-thirds are in developing countries.

To assist countries and institutions for whom minicomputers are too expensive or who do not have access to the Hewlett-Packard hardware needed to run MINISIS, a new in-Centre project was approved this year to develop a package of information management software for use on microcomputers. Systems analysts from two institutions in developing countries are participating in the development of the system using microcomputers manufactured in their own countries.

Making a Good Idea Better

It seemed like a good idea at the time: to develop an efficient information-management system for use on a minicomputer. The time was 1976 and the information explosion required the use of computers simply to cope with the volume of new information being created. For most developing countries, however, the high cost of computers and programs meant that these systems were beyond their means.

The work took two IDRC systems analysts two years, and the end result was MINISIS — so named for "mini" computer and ISIS, the parent system (Integrated Set of Information Systems) developed by the International Labour Office (ILO) for full-sized computers. In the years that have followed MINISIS' implementation, the idea has proven itself over and over again.

A low-cost versatile package, MINISIS operates on the Hewlett-Packard 3000 family of minicomputers. It lends itself to many different applications, including library management functions. Its popularity has extended far beyond the people it was originally intended to serve — the IDRC library and institutions in developing countries — to reach industrialized-country governments and institutions, from sports-coaching associations in Canada to food industries in Switzerland. The ILO itself has replaced ISIS with its offspring.

There are currently some 60 members in the MINISIS family of users around the world and the program has become a key component of some global, regional, and national information networks. Some examples are: the UN Regional Economic Commission for Africa is collecting documents relevant to social and economic development; the Information Services Unit of the UN Department of Economic and Social Affairs is collecting and merging data from the Regional Economic Commissions; and the Centre national de documentation in Morocco is establishing a national network for document collection. There are five installations in Beijing, China, and the FAO has chosen MINISIS for four installations in Southeast Asia for its aquaculture development program.

MINISIS' versatility and flexibility are the key to its success. Equally important, it is — in computer jargon — "user friendly," that is, easy to learn even for those with little or no experience of computerized information systems.

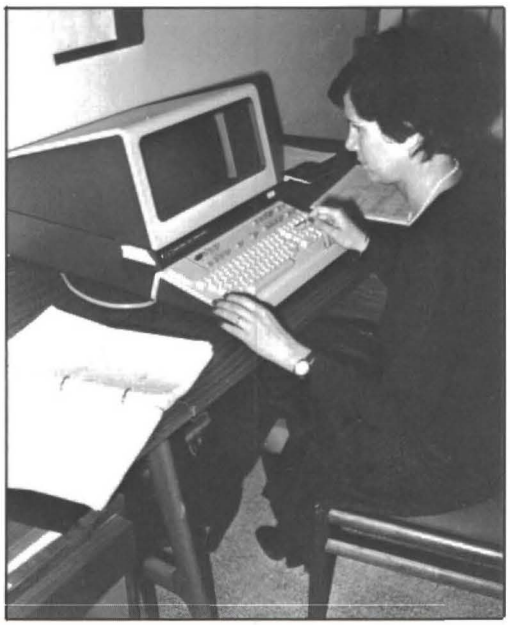
Until recently, however, MINISIS was user friendly only if the user spoke and wrote a language based on the Roman alphabet, preferably English or French. As Faye Daneliuk and Richard Lee, who designed MINISIS explain: "Considerable dissatisfaction arose against the computer manufacturers in the Western World because computers were oriented towards the Roman alphabet and, in fact, the English language. In those countries in which the loudest concern was expressed, computers were being used by those educated in the West, in the English tongue."

Indeed, the lack of tools in languages such as Arabic, Thai, and Korean is a factor limiting the achievements of many Third World scientists. To have access to information, and to contribute their findings, these scientists must learn not only a second language, but also a second alphabet. Those who fail to do so cannot have access to computers.

"There have been few software tools developed with an international audience in mind," says Charles Godfrey, Associate Director of IDRC's Information Sciences Division. "The IDRC philosophy recognizes that it is important to adapt tools to the environment in which they are used. And language is part of that environment."

In 1980, the Arab League was automating the socioeconomic information services that it provides to its members. It identified MINISIS as an appropriate system for carrying out the work, but needed to be able to process Arabic, in the Arabic script. Computer terminals that support Arabic script were available, but software was not. IDRC took up the challenge.

The first problem, explains Richard Lee, head of MINISIS Future Systems,



MINISIS in Tunisia: few software tools were developed for an international audience.

was that of lexicography — the order in which symbols are ordered, as in a dictionary. When a sequence or order exists, the computer can be used to sort sets of data. But Arabic has two systems in use: the Arab League had first to decide on the use of only one.

Designing a coding scheme for the characters themselves, and a system for letting the computer know which script — Roman or Arabic — was being used, took two years. The work was carried out in close collaboration with the Arab League.

The system was installed at the Arab League headquarters in Tunis this year. The League itself is responsible for translating the "commands" — the instructions given to the computer — into Arabic.

The alternate character-set capability developed will not only handle Arabic, says Lee. "It's a general solution that can store and retrieve any non-Roman script character set — up to 16 of them simultaneously — as long as the number of characters in the set does not exceed 128 and can be displayed horizontally. The Roman alphabet, for example, has 26 letters, in upper and lower case, plus numbers, punctuation marks, and some special symbols. It is read horizontally, left to right." Discussions are under way for adapting the system to Korean and Thai as well as some Indian languages.

The Arab League member organizations are now forming an information network and all will use the same tools. The MINISIS system has been installed at six locations and discussions are under way for a further six installations. The Arab League itself is providing support and training to members in the use of MINISIS.

The new MINISIS package — Version E — has been issued to all users. The user group, which includes all developing country and international organizations to whom IDRC has provided the package, as well as the distributors who handle sales in industrialized countries and to commercial enterprises in developing countries, meets annually to exchange information. "It is somewhat unique in user groups," notes Godfrey. "What we see happening is a mix of institutions dealing with one another on an equal footing, sharing their experiences, with a growing participation by developing-country users. This wouldn't be possible in a commercial atmosphere."

Social Sciences Program

Many middle-income developing countries have begun the transition from an agrarian to an industrial economy. This critical phase in their socio-economic evolution means a new configuration of development problems and priorities. The lower-income countries that have not yet seen a decline in their agricultural labour force could benefit from a close study and observation of the path followed by their more-developed counterparts.

In the broadest terms, the mandate of IDRC's Social Sciences Division is to help societies gain, through applied research, a better understanding of the complexities of development processes. Such understanding means that problems and solutions are more clearly identified, and effective policies to deal with them more clearly articulated.

The division's program and the increase in the number of its projects in the last few years reflect the importance of social and economic research to the development process. The division has diversified its approach to the funding of research and training in recent years, placing emphasis on areas where research environments are fragile and institutions untested. Workshops, study tours, and training, as well as project funding, are intended to support and strengthen research capability. Increasing attention is also being paid to the development of research capacity in the more remote countries, and in underprivileged areas within countries. Larger projects are supported in areas of greater institutional strength.

In 1982, 114 projects were initiated, totaling some $10.3 million. Operationally, the division is the second largest of the Centre's program divisions, accounting for close to 25 percent of the total project budget.

The division's program is focused on six main areas:

- Economics and rural modernization: Economic policies and their impact on development, agricultural development, impact studies, labour supply and employment, and regional development studies are all stressed.
- Science and technology policy: Issues studied include national technology choices, effects of technical change, diffusion of technology, and markets for technology as they relate both to industrialization and to rural development.
- Population and development: Understanding and solving population problems is the main thrust. Studies include the development of training materials and programs, research into the determinants of fertility and mortality, population movements, and evaluations of population policies and programs. A new subprogram focuses on the rural poor.
- Energy policy: The focus is on methodologies to assess current energy consumption patterns and needs, and the cost effectiveness of alternatives, particularly in the rural areas of developing countries.
- Urban policies: Improving service delivery to the urban poor, evaluating low-cost markets, urban land, informal employment, and development policies are the major components of this program.
- Education: The program concentrates on the basic cycle of education and the relationship between education and work, and the encouragement and utilization of educational research.

The division also supports the activities of national, regional, and international social sciences organizations, thus strengthening research infrastructures and providing training and research opportunities for young scholars.

David W. Steedman was appointed director of the Social Sciences Division in 1978.

The Year in Review — Rural development programs have helped overcome obstacles to increased agricultural production and have benefited the poor in many areas. In other regions, however, little progress has been made. The

result is a stagnant, or declining, agricultural output, higher food prices, and increased malnutrition.

In the past few years, the harsh economic climate has also taken its toll. In Peru, for example, inflation rose to 68 percent by 1970 and was accompanied by a sharp recession. One of the causes of Peru's economic woes has been hypothesized to be the stagnation of the agricultural sector. The accompanying rapid population growth has meant that the price of agricultural goods has increased. Because of their reduced purchasing power, lower-income groups are most seriously affected.

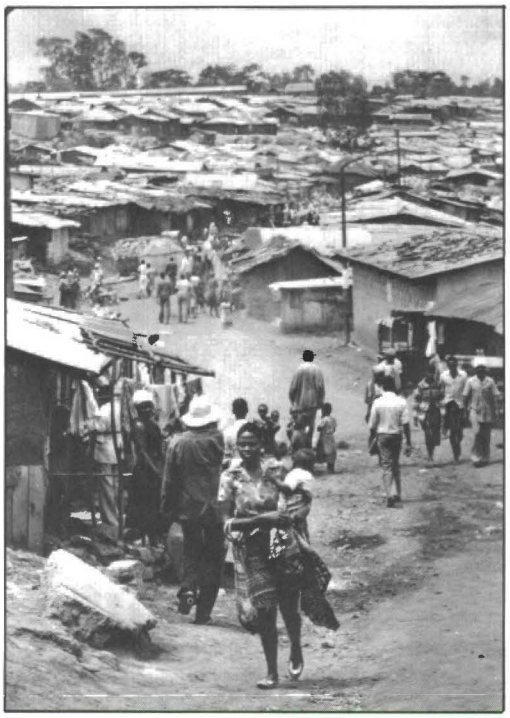
A project funded this year will study the relationship between agriculture, food, and inflation in Peru and the impact of inflation on the peasant economy. The impact of inflation is also being studied in Argentina where far-reaching financial reforms, enacted in 1977, liberalized the country's financial market. The findings should assist Argentina and other developing countries to understand better the performance of financial markets vis-à-vis different regulations and interventions.

In Kenya, the structural readjustment of the economy is being studied to help the Ministry of Planning and Development formulate long-term strategies and establish a framework for the 1984–1988 development plan. A similar macroeconomic study was also launched in Brazil this year.

In many African countries, food production has not kept pace with demand. The need for food imports increased at the same time as earnings from agricultural exports decreased creating serious balance-of-payments problems. The question is not only how to increase production, but also how to transform the rural economy to provide opportunities for people to participate in agricultural production and rural development.

Projects were launched this year in Zaire to better understand the constraints of rice farmers and examine the systems of food production and marketing in the Bandundu region. Dairy marketing is also being studied in Zimbabwe. In Tanzania, the systems of production and marketing of oilseeds are being examined to recommend ways of increasing export earnings.

Fisheries are an important component of the economies of many developing countries. In Zambia, the Lake Kafue fisheries have been successful in expanding food supplies and providing incomes. Because it is one of the few dynamic, growing areas of production in the country, it is now being studied to better understand the economic and technological operations of the fisheries and to recommend policy changes to foster their development. In Costa Rica, the development of fisheries and aquaculture are key economic priorities. Although fish supply has increased in recent years, the full potential has not yet been realized. The impact of government policies is now being analyzed to identify programs for the development of the country's marine resources. In Malaysia, a project will develop a



Harsh times: studying the need to readjust economic structures.

research program in fisheries economies to assist policymakers charged with the development of this sector.

High unemployment and low foreign-exchange reserves are dual problems within the Indian economy. Until recently, the government has been committed to a policy of import substitution, but this policy does not generate foreign exchange. A project launched this year will examine the relationship between exports and employment creation in the handicrafts, leather, and tourism industries. The policies affecting these industries will also be studied to recommend improvements.

Exports are also the target of a project in Nicaragua. By identifying nontraditional agricultural products for export, the research aims to help generate foreign exchange and assist in planning the country's agricultural development.

The demographic impact of development efforts continues to be a focus of the division's population and development research program. Grants were approved this year for projects in Mexico and Zambia to study differences between families engaged in different types of agricultural production. The reverse — the impact of population on development efforts — is being studied in Colombia and Argentina.

Child mortality levels are an important indicator of a country's socioeconomic development. In Argentina, however, infant death rates remain high despite a relatively advanced level of development. To find out why, researchers are examining the causes and levels of child illness and death in the city of Rosario. Chilean researchers are concerned with the other side of the coin: finding out why infant mortality has declined dramatically despite deteriorating socioeconomic conditions.

In Bangladesh, a methodology for measuring the conditions that contribute to illness and death from diarrheal diseases will be tested. Projects were also approved to study how the family structure influences young couples' decisions about contraceptive use and to analyze the effectiveness of various types of family-planning programs.

Population movements are increasing in developing countries as more farm families migrate to the city in search of a better life. The problems posed by rapid urbanization have now become a priority in many countries. In Quito, Ecuador, and in Nigerian cities, land and housing for the urban poor are in short supply. New projects seek to formulate recommendations for alleviating this shortage. In Abidjan, Ivory Coast, researchers are now assessing the effectiveness of a recently implemented low-cost program.

The provision of other urban services, such as waste disposal systems, is also being studied in Korea and the Sudan. In Bangkok and Manila, retail food markets serving the poor are being examined.

Retail food markets: providing low-cost urban services.

Employment is a crucial need in the expanding cities. Grants were approved this year for three projects — in Togo, Colombia, and Ecuador — that are examining the importance of the informal manufacturing sector in providing employment.

The division's education program supports research into education at all levels, from child-to-child training within the home in Colombia to

evaluations of teacher-training institutes in Liberia and Colombia. In Chile, as in many developing countries, many children of poor families do not finish primary school. Two new projects are analyzing teachers' attitudes and other factors within the school system that may contribute to the success or failure of pupils.

Innovative methods of dispensing mass primary education are also a focus of the education program. In the Philippines, an evaluation began this year of a program that combines education with rural development — the People's Schools.

The quality of education, particularly in the sciences, has been questioned in a number of countries. In the Dominican Republic and Kenya, the teaching of mathematics and biology respectively is being examined. The role of schools in transmitting values to adolescents in Morocco is also being evaluated.

Much education is not acquired in schools but through nonformal means such as the mass media. In Peru, radio is a significant means of communication, reaching isolated, illiterate farmers in their own language. The range of radio programing aimed at rural populations is being documented in a new project. Other projects are examining participation of the mass media and the role of television in development.

Policymakers in developing countries face unenviable choices. The slowdown in international trade has constrained their growth, in turn limiting investment. The balance-of-payments crisis many of them face means few financial resources are available for development programs. The projects supported through the science and technology policy program reflect to a large extent the changes in the world economy. They also testify to a growing awareness that technology choices are crucial for development. During the past year, grants were approved for projects ranging from studies of spinning and weaving techniques in Bangladesh to the impact of national development banks on the acquisition of technology in four countries.

Energy policy research has been expanded this year and now forms a subprogram within the science and technology policy program. Close attention is being paid to the search for energy systems, the construction of an infrastructure, and the initiation of a research base so that developing countries can better control this important sector. Projects approved this year include: a review of rural energy surveys in India to improve research methods; a study of food and fuel production in Kenyan cities; and a review of energy planning in Latin America.

Studying the Future Today

"Science and technology policy is not a discipline," says Tony Tillett, an associate director in the Social Sciences Division, "it's a set of problems." In the drive for development and industrialization, developing countries face difficult choices: Large- or small-scale production? Efficiency versus employment? Traditional or modern technologies? How are they acquired? At what cost? What are their effect on people? How are people to be trained? "Nobody has the answers," he says, "and anyway, the answers keep changing."

Science and technology policy is comprised of three "moving targets," says Tillett. Each is a separate field — complex, fragmented, and specialized. What is essential for developing countries is to have a group of people who understand how science and technology work, and what their effects will be.

That is the goal of IDRC's science and technology policy program: to add to the body of knowledge on how science and technology contribute to development. This knowledge should lead to better decisions and policies and benefit not only government policymakers, but also those who use technology — factory managers, farmers, urban decision-makers, and peasants. Begun in 1972, the program has supported some 70 projects dealing with technology policy

for both industrial requirements and the needs of rural areas.

An interdisciplinary approach has been essential. Effective policies must be based on accurate information and an understanding of the issues facing the producer and the consumer.

The program is concerned with technology policy at all levels, from the traditional rural technologies to the most sophisticated. At the simplest level, a network of projects in Latin America is asking how peasant societies survive when under pressure from a technology they neither understand nor participate in.

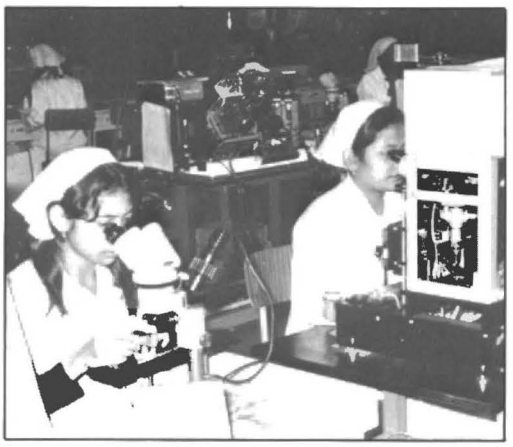
In Paraguay, for example, small farmers are being displaced by the swift expansion of commercial agriculture. High population growth and lack of new lands are reducing the average farm size. If the small farmers are to survive, they must change their farming methods: to do so will require improving their technology. Researchers are now surveying conditions of peasant farms, particularly their use of technology, to find ways of using available technologies more efficiently.

As Chris Smart, program officer for science and technology policy, explains, "The peasant has a technology that has been denigrated. The challenge is to find how to build on what peasants have already so they can maintain themselves under pressure."

In Peru, an appropriate technology group, the Talpuy Grupo de Investigación y Extensión de Tecnología Popular (TGIETP) has been promoting knowledge about technologies currently used by peasants because many of these technologies are known to only a few. TGIETP has thus been working at disseminating this information through publications and demonstrations. IDRC is funding an evaluation of this rural technology extension work.

In Colombia, an experimental rural university is training students for rural development activities, particularly in agricultural extension. A project is now evaluating and further developing the approach and the technologies being experimented upon. In 1982, a project was funded to enable the Fundación para la Aplicación y la Enseñanza de las Ciencias in Cali, Colombia, to organize a network of centres undertaking research in this area.

At the other end of the technological scale are sophisticated technologies such as microelectronics. There is a growing concern in developing countries that technological developments based on the silicon chip will alter and possibly destroy their manufacturing capacity. Many realize that their future may depend on investment in this field, and several newly industrialized countries, such as Mexico and Brazil, have industries devoted to microelectronics.



High technology: will the silicon chip destroy manufacturing capacity of developing countries?

For many countries that now provide manufacturing labour, the problem is one of competition. With the increase of manufacturing by microelectronic means — robotics — in industrialized countries, developing countries are losing their competitive advantage, that of supplying cheap labour. An important question is: what will microelectronics do to their economic health? Some are also beginning to ask what microelectronics can do for them, as well as to them. The science and technology policy program has been actively studying this area and a network of projects is expected to begin in 1983.

The radical shifts in technology now taking place are obviously affecting

employment. Higher skills levels are essential for the development of industries and technology-based occupations. Rapid technology change alters these requirements so that people either do not realize their full potential, or become progressively "de-skilled." Increasing attention is being focused worldwide on the need to make significant changes in educational planning and labour-force development to take account of these changes.

Research in this area — technology, education, employment, and development (TEED) — is being developed jointly with the division's education program. A number of projects are already being carried out. In Brazil, for instance, a study of the effect of new equipment in the textile industry concluded that workers needed fewer skills to handle the new machines. In Thailand, a study of skilled-labour needs for the next 10 years is being carried out.

In 1977, the division began to support a program of science and technology policy training at the Science Policy Research Unit of the University of Sussex in England, where an IDRC program officer is based. Following on that work, a program of four major technology policy workshops began this year to introduce technology issues to policymakers in Africa and the Caribbean. Each month-long workshop is intended to stimulate the interest of researchers in technology policy-related fields and to foster links between policymakers and researchers. Says one of the project organizers: "The workshops have provided many of the participants with their first visit to the factory floor."

Other activities supported through the science and technology program include studies of resource-allocation policies for science and technology. This year, projects were funded in Latin America and Indonesia to analyze the generation and adoption of agricultural technologies.

The effects of new information technology on communications systems are also being studied. One project funded this year, for example, is examining the current and potential use of computer conferencing for scientific exchanges in Mexico and Brazil and is examining the laws that pertain to computer-based data flows. Program Officer Eva Rathgeber is responsible for projects in this field.

Underlying the program's activities is the certainty that developing countries will eventually have to make decisions about technology. "We believe it's better to make those decisions with information," says Tillett. "We are trying to help developing countries look at technological problems in the future. It's essential that they understand how things work."

To help them do so, the unit has assembled an international, multidisciplinary team of researchers on science and technology policy.

Cooperative Programs

Global research and development activities are now a $150-billion enterprise, employing some three million scientists and engineers. It can hardly be called global, however, for the developing countries spend only about three percent of this amount and employ just 13 percent of the scientists and engineers.

This disparity led developing countries at the UN Conference on Science and Technology for Development, held in Vienna in 1979, to ask for greater access to research. Canada's response was the creation of a new program, administered by IDRC, that would enable developing countries to share in Canadian research and development expertise. IDRC's Cooperative Programs Unit was launched in 1980.

The main orientation of the program is to promote collaboration between research groups in developing countries and their counterparts in Canada, whether in academic, governmental, or private sectors. By providing opportunities to work with Canadian institutions, the program will strengthen the scientific and technological capacity in the participating institutions in the Third World. The creation of such channels of communication among scientists is intended to improve the transfer of research results to researchers in developing countries, and the experience gained by the Canadian scientists should lead to a greater concern for the problems of developing countries.

In its first year of activity, the unit supported 10 projects. The substantial increase in the unit's budget in 1982, its second year of activity, enabled it to support 14 new projects, with grants totaling some $1.8 million.

The unit's mandate is broad: the research it supports can be in any field clearly related to the economic and social development of Third World countries and in which there is a recognized Canadian expertise.

Many of the projects supported from the Cooperative Programs budget complement the ongoing work of the Centre's four program divisions and are managed by them. The unit also began this year to develop an area of specialty, earth sciences, not covered by the program divisions. A series of consultations was held in developing countries and Canada this year to help define the focus of the new program.

The director of Cooperative Programs, James Mullin, was appointed in 1981.

The Year in Review — Research and development priorities in developing countries often mirror those in the industrialized world: the breeding of better crop varieties, finding new energy sources, and preventing environmental pollution are a few examples. Thus, although the conditions in which research results are to be applied differ, the process of research and of developing the new technologies is basically the same. Therefore, expertise gained in one environment can often be applied to a quite different locale.

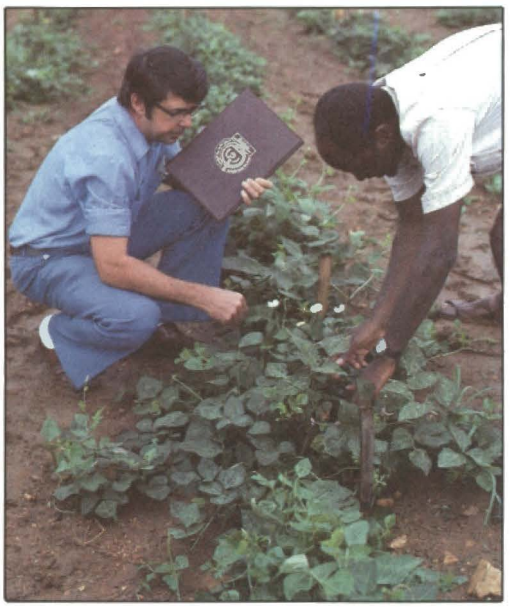
Channeling some of the scientific and technological expertise resident in the Canadian scientific community to the solution of problems in developing countries is the raison d'être of the Cooperative Programs Unit. In doing so, it adds a new dimension to IDRC's project capability. And, because of its broad terms of reference — to support any research clearly related to economic or social development of Third World countries — it can support projects that do not fall within the mandate of the Centre's four program divisions.

During 1982, about half of the grants appropriated by the Cooperative Programs Unit were in support of projects that fell within the areas of concentration of the Centre's program divisions, but which called for strong links to be established between researchers in the developing country and Canada.

Through the AFNS Division, for example, IDRC has supported a considerable amount of research on the improvement of food legume crops in developing countries. These crops boast a high protein content and the ability to produce well in nitrogen-deficient soils,

qualities that depend on the efficiency of nitrogen-fixing bacteria, rhizobia, associated with their roots.

Often, the crop-specific rhizobium must be introduced into the soil with the seeds. Most developing countries therefore import rhizobium inoculum from industrialized countries. The University of Manitoba has been investigating nitrogen-fixation for a number of years and recently has been selecting cold-tolerant rhizobium strains. Meanwhile, the International Center for Agricultural Research in the Dry Areas (ICARDA) in Syria has found that chickpeas can be grown as a winter crop with a large increase in yields — but a cold-tolerant rhizobium inoculant was required. The



Legumes fix their own nitrogen and boast a high protein content.

two institutions are now collaborating on the development of systems that could be used by small farmers for adding the rhizobium to the soil. The same institutions also launched the second phase of a project to develop varieties of faba beans resistant to common diseases.

Researchers from Memorial University in Newfoundland and the South Pacific Commission in New Caledonia also completed the first phase of a project to develop a biological control program for mosquitoes in the small country of Tuvalu. After the successful trial of a bacterium and a nematode against mosquito larvae and the introduction of an education campaign, the project is continuing to launch an integrated program that the researchers hope will reduce mosquito populations sufficiently to stop the spread of diseases.

New cooperative projects administered by the Social Sciences Division include a project by the Institut d'économie quantitative of Tunisia and the Centre de recherche pour le développement économique of the Université de Montréal to develop an economic strategy for Tunisia. Also in Tunisia, the causes of fertility decline in recent years are being studied to recommend improvements to the country's population policies.

In the information field, a new project seeks to strengthen data-processing and statistical services at the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT) in Mexico.

The second thrust of the Cooperative Programs Unit is support for research ventures in areas not supported by IDRC's program divisions. During 1982, these included the development of methods of identifying the sources of pollution of Trinidad's Caroni River, an analysis of freight transportation systems in Brazil, and a study related to the reintroduction of cooperatives in Tanzania.

Coming Down to Earth

In the 1950s, geologists knew that ocean basins were deep and floored with heavy rocks . . . and that was about all. Then came the revolution. The theory of plate tectonics did for geology what relativity did for physics: it tersely explained a wealth of observations.

Suddenly, continents and oceans once thought of as fixed were seen to ride the rigid slabs into which the earth's shell is broken. Where they collide, the crust crumples and mountains rise. The ocean floor is formed as molten lava rises to fill

the fissures left as the plates move apart from one another.

Learning just what lay at the bottom of the ocean floor would prove difficult and expensive, however, requiring submersible craft and drill ships: except in Cyprus.

Cyprus' Troodos massif — 3000 square kilometres of rock — is in fact a piece of the ocean floor marooned on dry land. Here, an international team of earth scientists, the Crustal Research Drilling Group, has launched a large project that will, for the first time, yield a complete vertical section of the ocean floor.

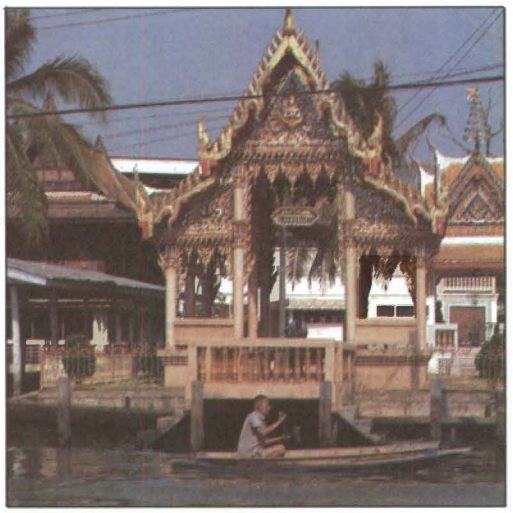
The drilling project will provide significant new evidence on the formation and evolution of the oceanic crust. It will also have practical applications: it might suggest underground sources of water for parched Cyprus, for example, or lead to new mineral exploration techniques.

Because a number of countries have areas with a strong geological similarity to the Troodos massif, IDRC supported a collaborative project between Dalhousie University and the Cyprus Geological Survey to enable geologists from a number of developing countries to join the project as trainees and collaborators. The Cyprus Crustal Study project exposes these scientists to state-of-the-art knowledge and interpretation of important areas of ocean-crust geology, hydrogeology, and drilling technology. The experience will assist them in the identification of ore deposits, sources of geothermal energy, and groundwater resources in their home countries.

This was the first venture supported by the Cooperative Programs in the area of earth sciences, specifically into resource assessment. A second project was also supported in 1982 to interpret aeromagnetic survey coverage of Nigeria to understand the country's crustal structure. Being carried out by the University of Manitoba and Ahmadu Bello University in Nigeria, the project will contribute to mineral and resource development.

Resource development is only one thrust of the new earth sciences program, which is intended to support research on all aspects of geology of the near-surface rocks. The Cooperative Programs Unit is expecting projects to develop in such areas as the identification of local rock-fertilizer sources, the location and development of groundwater resources (including studies of soil–water interactions that contribute to water purity). The development of appropriate small-scale techniques for extracting clays for ceramics and stone for construction are other possibilities.

Geotechnical research will also form a component of the program. Bangkok, for example, is sinking because of the depletion of groundwater. As a result, its famous canals are drying up, only to flood with every heavy rain. A number of



Depletion of groundwater in Bangkok: geotechnical research.

Third World cities face similar predicaments. Developing countries could benefit from a better understanding of this and other hazards — such as seismic activity, desertification, erosion, and the silting of harbours.

As with all projects supported by IDRC's program divisions, these are all intended to encourage research that addresses the basic needs of developing countries while strengthening their research capacities.

Office of Planning and Evaluation

At the UN Conference on New and Renewable Sources of Energy held in Nairobi in 1981, Canada's Prime Minister, Pierre Trudeau, announced that $10 million would be made available over four years to IDRC to support energy research related to developing countries. The first installment of the new grant was received in April 1982.

That month, the Centre hosted the first meeting of major funding agencies in the world to exchange information and develop a more responsive approach to funding energy research. The agencies agreed that coordination was needed to avoid the existing duplication of effort and a number of neglected areas were identified for further research. Subsequently, the first project — undertaken jointly with a major financing agency, the International Bank for Reconstruction and Development — was started in Haiti where soil erosion and lack of tree-planting programs have led to a severe shortage of fuelwood.

The most significant single new energy project launched in 1982, however, was the creation of an international advisory group composed of eminent researchers and policymakers from developing countries. This Energy Research Group (ERG) will review energy research needs, priorities, and resources.

To guide the buildup of the Centre's energy activities and encourage coordination, an internal energy committee was established, chaired by the Director of the Office of Planning and Evaluation (OPE). Established in 1979, the office is responsible for the operations of the Centre's five regional offices located in Colombia, Egypt, Kenya, Sénégal, and Singapore.

The OPE was created to increase the Centre's effectiveness in achieving its objectives. If IDRC is to remain responsive to the needs and priorities of developing countries, it requires a clear knowledge of those needs. Thus, OPE is involved in acquiring information on research resources and priorities.

As John Hardie, OPE's Deputy Director, stresses: "We are trying to mirror the Centre's philosophy of maximum involvement of local people in defining priorities." Thus, developing countries are given the opportunity to look at their own planning processes for research activities. This year, pilot studies have been undertaken in Costa Rica and Colombia. These studies aim to provide information on national research resources and institutions, how resources are currently allocated, and what national research priorities are. They should assist IDRC as well as the countries concerned in deciding on research resource allocation.

Other countries and regions have studied particular sectors — the allocation of resources to agricultural research in Asia and social sciences in the Middle East, for example. These activities have led to the creation, in Asia and Latin America, of regional groups of national research directors who are carrying out more detailed studies on such issues as scientific personnel planning and research management.

A new project, funded in 1982 in Cameroon, involves the Panafrican Institute for Development (PAID) in studying the resources devoted to agricultural research to help plan future development. It aims to ensure that the evaluation activities that it supports serve the information needs of particular users and are recycled into the planning process. In recent years, some individual projects and programs have been examined in depth. OPE is relying more on local persons to carry out these evaluations — in fact, it is often the project recipients who request that an evaluation be undertaken — to contribute to building and strengthening research evaluation capability in developing countries.

The Centre's regional offices are increasingly responsible for administering and monitoring planning and evaluation activities. This strong representation in the regions served by IDRC is essential

if the Centre is to be fully aware of needs and priorities and to be able to respond effectively.

To reinforce the Centre's responsiveness, IDRC's regional directors this year presented reports to the Centre's Board of Governors on the needs of their regions and the effectiveness with which IDRC is responding to those needs. This fresh perspective should help the Centre identify research sectors and activities in which it can make the most useful contribution.

Funding the Future

The general purpose of the Fellowship Program, administered by the Secretary's Office, is to assist in the training and upgrading of the qualifications of individual researchers, managers, and planners in scientific fields related to the broad mandate of IDRC. The program aims at building their research capabilities and thus strengthening research institutions in the Third World.

The Fellowship Program endeavours to meet these objectives by offering various types of awards, which vary in nature and number, according to changing needs as perceived by the Centre. The Program focuses principally on individuals from the least-developed countries and places greater emphasis on professional upgrading rather than on basic training. Tenure takes place in centres of excellence located, in order of priority, locally, regionally, in Canada, or in another developed country. IDRC award-holders are expected to return to their home country at the end of tenure.

The following Fellowship Program awards are not generally open to public competition because they must reflect Centre programs and projects:

- Pearson Fellowships are named after the former Canadian Prime Minister, Lester B. Pearson, who was Chairman of IDRC's Board of Governors from 1970 until his death in December 1972. They are offered to outstanding young public servants from Third World countries.
- Research Fellows are senior academics, researchers, policymakers, or planners who are fully committed to the field of international development. Fellowships are given to scholars from Canada or Third World countries and appointments are made by the Board of Governors on recommendation by the President.
- Program-related Awards are aimed at increasing the human resource base of research institutions in the Third World. These awards are directed to researchers as well as administrative and financial personnel in program areas that are of concern to IDRC.
- Project-related Awards are directed to researchers who have been, or are to be, associated with IDRC-supported projects. Training programs vary and include short-term courses tailored to the needs of the project, as well as academic studies leading to a post-graduate degree, preferably at the Master's level.
- Group-training Courses are designed for researchers, technicians, and administrative personnel from Third World countries. The courses provide for training that is not degree-specific, and are generally taught by staff members of local and regional institutions.
- Young Canadian Researchers are doctoral students registered in a Canadian university (students at the Master's level may be considered in the fields of Health Sciences and Communications). The objective of this program is to encourage the involvement of young Canadian researchers in scientific areas of concern to IDRC and to give them, at the same time, exposure to problems of Third World countries.

In addition to the above awards, the Fellowship Program contributes financially to the training programs offered by: The International Foundation for Sciences in Stockholm, Sweden; and The Hague Academy of International Law at The Hague, The Netherlands.

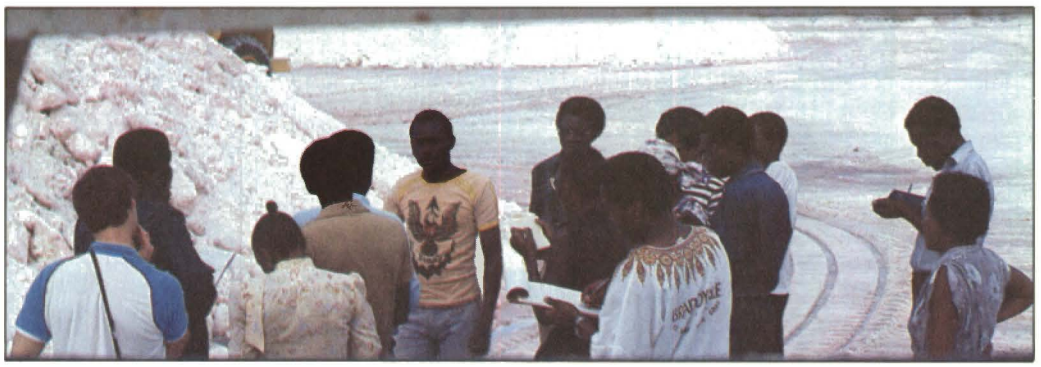
Communications

Disseminating the results of research supported by the Centre and promoting the importance of development research are the dual roles of the Centre's Communications Division.

Under its publications program, the division produces a wide range of monographs and technical studies for worldwide distribution, particularly in the developing countries. It also produces publications of a more popular nature, such as this review, a quarterly magazine in three language editions, a feature-article service for news media in developing countries, and the IDRC annual report.

and southern Africa, and from Southeast Asia, to improve their skills in communicating information about science and technology for development to the general public in their countries through the mass media.

This transfer of information is essential if the populations of developing countries are to understand and participate in their countries' development efforts. These two workshops followed an earlier one for francophone African journalists held in Dakar, Sénégal, in 1981. The participants at Dakar and Nairobi have since formed regional science-writers' associations to further the exchange of scientific information among African mass media.



Young journalists sharpen their skills: mass media do more than entertain in the developing world.

Complementing this program, greater attention is being paid to developing and strengthening scientific publishing activities in developing countries through consultation and copublishing ventures.

The division has also supported some important initiatives in media development in the Third World that complement its in-house activities. For example, it has been supporting the production of science-oriented feature stories by development news agencies in Asia and Latin America.

In 1982, the division also supported international science-writing workshops in Nairobi, Kenya, and Dumaguete City, Philippines, on development science writing. These workshops are aimed at helping young journalists from eastern

The division also produces films for both educational and training purposes. In 1982, two IDRC films won awards at the ninth International Scientific and Technical Film Festival held in Brussels. "La pêche secondaire . . . un cadeau des mers" (Fish by-catch . . . bonus from the sea), about an IDRC-supported project in Guyana, won in the category of natural-resources management. "Project Impact: the overview," about a novel system for providing mass primary education, took the medal in the category of films about teaching methods.

The list of publications and films produced by the Centre during 1982 follows. Catalogues of all current IDRC productions are available on request.

Publications

IDRC annual report 1981–1982, Rapport annuel CRDI 1981–1982. 120 p. IDRC-003/82e,f

L'adieu au pilon: un nouveau système de mouture mécanique en Afrique. P. Eastman. 68 p. IDRC-152f (Also available in English IDRC-152e)

Approvisionnement en eau dans les régions rurales des pays en voie de développement : compte rendu du colloque tenu à Zomba (Malawi) du 5 au 12 août 1980. 137 p. IDRC-167f (Also available in English IDRC-167e)

Les problèmes d'assainissement dans les pays en voie de développement: compte rendu sur la formation tenu à Lobatsi (Botswana) du 14 au 20 août 1980. 166 p. IDRC-168f (Also available in English IDRC-168e)

Una decada de aprendizaje: Centro Internacional de Investigaciones para el Desarrollo, División de Ciencias Agrícolas, Alimentos y Nutrición: Los primeros diez años. 192 p. IDRC-170s (Also available in English IDRC-170e and French IDRC-170f)

Remote sensing and development: report on IDRC-supported projects in the Sudan, Bolivia, Tanzania, Bangladesh, and Mali. R. LeBlond. 24 p. IDRC-174e (Also available in French IDRC-174f)

Root crops in eastern Africa: proceedings of a workshop held in Kigali, Rwanda, 23–27 November 1980. 128 p. IDRC-177e

International Development Research Centre: projects, 1970–1981. 384 p. IDRC-180e (Also available in French IDRC-180f and Spanish IDRC-180s)

Renewable resources in the Pacific: proceedings of the 12th Pacific Trade and Development Conference, held in Vancouver, Canada, 7–11 September 1981. H.E. English and A. Scott, editors. 293 p. IDRC-181e

Asignación de recursos para la investigación agrícola: actividades del taller efectuado en Singapur, del 8 al 10 de junio de 1981. D. Daniels y B. Nestel, editores. 171 p. IDRC-182s (Also available in English IDRC-182e and French IDRC-182f)

Low-cost transport in Asia: a comparative report on five cities. R.B. Ocampo. 77 p. IDRC-183e

Nutritional factors involved in the goitrogenic action of cassava. F. Delange, F.B. Iteke, and A.M. Ermans, editors. 100 p. IDRC-184e

Intercropping: proceedings of the Second Symposium on Intercropping in Semi-Arid Areas, held at Morogoro, Tanzania, 4–7 August 1980. C.L. Keswani and B.J. Ndunguru, editors. 168 p. IDRC-186e

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Films

The Mysterious Milkfish: Increasing Yield Through Research — In Southeast Asia, the milkfish is popular not only for its taste but also for its nutritional value. In the Philippines, where it is one of the few affordable sources of protein, the supply is seasonal and uncertain, and only about half the captured fry ever survive to market size. "The Mysterious Milkfish" documents how scientists at the Southeast Asian Fisheries Development Center (SEAFDEC) in the Philippines have succeeded in breeding milkfish in captivity, and explains how their gradually increasing knowledge of the species may lead to greater productivity in the milkfish industry. The 27½ minute, 16-mm colour film was produced by Neill McKee for IDRC.

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